Amendments to the Drawings:

Attached are replacement and annotated sheets of amended FIGS. 1, 3, 6 and 7.

Attachment: Replacement Sheets

Annotated Sheets Showing Changes

REMARKS/ARGUMENTS

Claims 3-8, 10-12, 14-20, 22-35 and 37-39 remain in this application. Claims 4, 7, 14, 15, 16, 27, 28, 37 and 39 were indicated to be allowable if in independent form and certain objections under 35 U.S.C. § 112 corrected. Applicants submit that all of these claims are now in condition for allowance.

OBJECTIONS

The Examiner has made several objections to the drawings, specification and claims. The care that was taken in reviewing the entire application as the basis for these objections is sincerely appreciated. Each of the objections has been addressed and changes made in the application where appropriate. Applicants, however, do not agree with some of the objections and as to those no changes have been made. The changes or reasons are set forth as follows:

The Examiner alleges that a combination of a strip extending diagonally across the duct where a drain is near its downstream end (claims 5-8, and 18-20) is not illustrated in the drawings. A diagonal strip in a non-horizontal portion of the air duct is shown at 27 in FIG. 3, for example. A drain opening at the lower or downstream end of the strip, with a reference numeral 25 has been added to FIG. 3 and the reference numeral 25 added to the specification where that feature is mentioned. This objection is therefore no longer appropriate.

The Examiner has alleged that a hollow cone with a porous surface (claims 12, 24, 26 and 29) is not illustrated in the drawings. An air inlet cone is illustrated in several places in the drawings. The porosity of an embodiment of such a cone is not separately illustrated and would not be needed. The porosity of the metal is a property of the metal and does not need to be separately illustrated any more than if Applicants had claimed that the cone was stainless steel or some other material. There are often such characteristics of a material, for example, which are not illustrated and may not even be susceptible of illustration. This objection should be withdrawn.

Somewhat similarly the Examiner has objected to guide vanes with a porous surface (claim 27), only a downstream portion of the vane being porous (claim 28), and only a

downstream portion of the compressor inlet cone being porous (claim 30). No changes have been made in the drawings to illustrate this characteristic of the material for the vanes or cone. Although Applicants consider that any illustration of such a characteristic of the material is unnecessary, we will entertain any suggestions the Examiner might have for making such an illustration.

The Examiner objected that the drawings did not include vanes having a suction device (claim 27), and sucking water from a hollow strut (claim 37) or inlet guide vane (claim 39). Illustrating the verb "sucking" seems inappropriate, however, in an effort to respond to this objection an arrow indicating suction along the length of a vane, for example, has been added to FIG. 7. When this change is accepted, it is requested that this objection be withdrawn.

The objections to reference numerals 16, 33 and 34 in FIGS. 1 and 6 have been corrected.

The Examiner objected to the specification at page 4, line 32 alleging that "a" should be inserted after "of". Applicants submit that such a change is inappropriate. First of all this would render the sentence grammatically incorrect. Secondly, it seems that the Examiner wants to replace the definite article "the" with an indefinite article "a". This is not required in the description, nor would it be if this definite article were used in a claim. The objection seems to be based on this being the first mention of guide vanes, for example, in the description. It is not necessary to use an indefinite article upon the first reference to something that is inherent in an object. For example, one is perfectly correct in reciting "the end of a bar" when there has been no previous mention of an end. A bar inherently has an end and it is not necessary to recite "a bar having an end" as an antecedent. There are possibly compressor inlets without guide vanes, but at least for the examples described in this application, a guide vane is inherent in the structure and a definite article is quite appropriate in the description.

The objection at page 11 has been corrected.

The specification was also objected to as failing to provide antecedent basis for some of the claimed subject matter. It is believed that the antecedents in the description have been overlooked.

It is alleged that there is no antecedent for claims 11 and 23 which recite a dam around at least a portion of the inlet cone for the compressor. The ring described at page 9, lines 14 and 15 comprises such a dam extending at least a portion of the way around the cone, i.e., all the way away around. This was referred to as a ring in the description and to clarify that, it is now mentioned as a "ring or dam 22". This is nothing new, it's simply an alternative name for the ring shaped dam already described.

The allegedly missing antecedent for claim 30 is found at page 9, line 16. The alleged missing antecedent for claim 32 is found at page 6, lines 12-21. The alleged missing antecedent for claim 34 is found at page 8, lines 19-21. All of these objections to the specification for lacking antecedent basis should be withdrawn.

The alleged informalities in the claims mentioned on page 4 of the Office action, have in general been changed by amendment, even though Applicants do not agree that any changes are appropriate in some cases. For example, the Examiner alleged that the adjectives "compressor inlet" should precede cone. It is not necessary that all of the adjectives for a feature such as the cone which has already been set forth need to be repeated each time the cone is mentioned. If there were more than one cone this might be appropriate, but it is not needed in claim 23, for example. Regardless, it has been added since it does not change the scope of the claim at all.

The objection in claim 33 suggesting that "said step of" should be added is inappropriate. Whether this is a "step" under § 112 is open to interpretation and whether "step" is included in the claim is entirely within the discretion of the Applicant. Claim 33 is completely clear and definite without the suggested addition. "Diverting" in claim 33 clearly refers to the verb "diverting" in parent claim 31. This objection should be withdrawn.

As to the alleged indefiniteness issues at page 5 of the PTO action: Claims 10, 11 and 12 are rectified by rewriting claim 10 in independent form. Claims 17, 18 and 37 to 39 are also rewritten independent. These rejections are no longer valid.

PRIOR ART REJECTIONS

This application concerns handling of water of input air to the compressor of a gas turbine (sometimes called a combustion turbine). It is often desirable to enhance the efficiency

of a turbine by cooling the input air to its compressor with a fog of water droplets. In many cases efficiency can be further improved by "overspray" where the amount of water added to the inlet air exceeds 100% relative humidity and some of the water droplets in the fog enter the compressor. When cooling the inlet air, with or without overspray, there are commonly water droplets that impact walls of the air inlet duct, guide vanes, the compressor inlet cone and other structures upstream from the compressor. Films of liquid water commonly occur in the inlet air duct. It is undesirable to have such water enter the compressor for a variety of reasons. This application concerns removing such water from the inlet duct and other structures to keep it out of the compressor.

Several aspects of handling such excess water are described and claimed in this application. For example, a narrow "dam" may be attached to the duct wall in a direction diagonal to the air flow through the duct so as to divert water flowing along the duct wall to a drain opening. Suction is applied to the drain opening to withdraw water, rather than relying solely on gravity. The drain opening may be simply a hole through the duct wall or may be a perforated tube laid along at least part of the length of the dam. Similarly, a dam may be attached around the compressor air inlet cone and/or the bell mouth of the compressor. Such locations are sort of the last chance to keep liquid water out of the compressor. Alternatively, the compressor air inlet cone and/or struts within the air duct may be partly made of porous material or have perforations through which water may be sucked for removal from within the air duct. These are exemplary of features recited in Applicants' claims.

Claims 1, 9, 10, 12, 13, 22, 24-26, 29-31, 36 and 38 were rejected under 35 U.S.C. § 102 as anticipated by a patent to Graemiger. The Graemiger reference does not concern a gas turbine compressor; instead it describes a centrifugal compressor for a vapor such as steam where the same liquid, e.g., water, is injected to cool the vapor after compression. Thus, in the compressor there is gas and liquid of the same composition.

In the Graemiger compressor there is an air inlet duct 1 leading to four stages of compression from which the compressed vapor exits at 6 (FIG. 2). Liquid accumulates in the bottom of the chambers between the compression stages (FIG. 4). Such liquid may be drawn out

of the upstream chamber 25 and pumped into the downstream chamber 13. (The liquid needs to be pumped in since pressure is high in the last stage of the compressor. There are passages (e.g., 22) between the chambers so that the liquid flows, countercurrent to the flow of vapor, from the downstream chamber towards the upstream chamber. The liquid flow is induced since the pressure in the downstream chamber is greater than the pressure in the upstream chamber.

The Examiner characterizes some of the structural elements of the Graemiger compressor using terminology from Applicants' claims. Applicants take issue with some of this characterization. For example, the Examiner states that there is "a drain (the vertical passage adjacent 26) connecting to the inside of the duct . . . the drain being located on the compressor inlet cone, the drain comprising the hollow cone and a perforated surface (the vertical passage adjacent 26) on a cone, only a downstream portion of the inlet cone being perforated." According to the Examiner, the passage near 26 is both a drain and a perforated surface so that the terms of the claim allegedly be present in the reference.

More significantly, the Examiner characterizes the inlet duct of the Graemiger compressor as a "compressor inlet cone". The inlet duct of the Graemiger compressor converges toward the first compressor stage, but it is still a duct, and is not a compressor inlet cone within the inlet air duct as recited in Applicants' claim 10, for example. A compressor air inlet cone, as illustrated at 17 in FIGS. 1-3 of the drawings, is a generally conical structure within the air duct concentric with the hub of the axial flow compressor for assuring that air flow goes into the blades surrounding the hub. (Such a compressor inlet cone may be curved and is not necessarily a geometric cone.) The converging passage of the air inlet duct in the Graemiger compressor is not a "compressor inlet cone within the inlet air duct." Regardless what the Examiner says, it is still just a duct. A compressor inlet cone as used this application is not a duct, it is separate structure within the duct.

Thus, since claim 10 cites such a compressor air inlet cone within the duct it cannot be anticipated by the Graemiger compressor.

Claim 11 is dependent from claim 10 and was rejected only under 35 U.S.C. § 112. There was no prior art rejection of claim 11. The alleged § 112 question is resolved by the

amendment of claim 10. Thus, claim 11 is considered to be allowable on its own as well as because of its dependency from claim 10.

Similarly, claim 12 is considered allowable along with claim 10. Claim 12 recites that the compressor inlet cone is hollow with a "perforated or porous surface." The Examiner takes the position that a single passage provides a "perforated surface." Concededly, a dictionary definition of "perforated" is broad enough to include a single hole. However, this is not the way the term is used in this application. In effect, perforated and porous surfaces are synonymous. Such a porous surface could be made by sintering metal powder, for example, or a multitude of small perforations could be made to the surface. This limited definition of the term can be seen, for example, at page 9, lines 22-23, "using perforations or porous metal for drawing water to the interior of the cone . . ." This is also consistent with the usage at page 6 beginning at line 14. Since claim 12 recites that the cone includes a perforated or porous surface it should be allowed.

Claim 17 has been written in independent form and includes recitation of a perforated strut in the air duct. It should also be allowed since there is no such structure known from the prior art in this application. Claims 24, 26, 29 and 30 also recite perforated or porous surfaces and should be allowed for similar reasons.

Claims 22 and 25 were rejected under§ 102 on the basis of the Graemiger reference. These claims recite that there is a drain on a "compressor inlet cone within the duct." As pointed out above, the converging portion of the inlet duct of the Graemiger reference is not a compressor inlet cone within the duct. Applicants are reciting a structure different from and not present in the Graemiger compressor. These claims and the claims dependent from them should therefore be allowed.

Claims 3, 5, 6, 8, 21, 32 and 33 were rejected under 35 U.S.C. § 103 as being unpatentable over the Graemiger patent. Claim 3, for example, recites a dam extending into the air flow through the duct for directing water flowing on an air inlet duct wall toward a drain. The Examiner alleges that Graemiger includes "a dam 29, 30 extending into air flow . . . and a strip 30 extending diagonally across air flow. . ." According to *Webster's Third New International Dictionary*, "dam" is "a barrier preventing the flow water . . ." Applicants concede

that the angle iron baffle plate 29 in the Graemiger reference can be considered to be a dam even though its avowed purpose is to prevent water coming through the channel 18 from squirting too high into the steam in the compressor.

However, the sieve 30 illustrated near the bottom of a chamber in FIGS. 4 and 5 is not a dam. The sieve (i.e. a porous sheet) is a small distance above the normal water level in the chamber. As illustrated in FIG. 4 it extends along (rather than across) the direction of steam flow from the first stage of the compressor into the second chamber 23. Possibly, the Examiner has considered that the curl illustrated near the V at the right side of FIG. 5 is part of the sieve extending across air flow. This interpretation is incorrect as shown by the description in Graemiger on page 3, lines 56-62 "furthermore the sieve prevents that the steam rotating in the space 23 in the direction of arrow IV carries away particles of water and causes a wave in the water as indicated by arrow V shown in dotted lines, whereby the water would be admixed to the steam in the shape of drops." (emphasis added) Thus, the phantom curl illustrated in FIG. 5 shows what would happen if the sieve 30 were not present. The sieve over the water may not be considered either a dam or a strip extending diagonally across air flow as alleged by the Examiner.

Referring again to claim 3, there is a dam extending into the air flow for directing water flowing on an air inlet duct wall toward the drain. Applicants submit that the baffle plate 29 does not direct water flowing on an air inlet duct wall toward a drain. The baffle plate keeps water from an inlet 18 from squirting too high. The unnumbered drain from the chamber 19 to the chamber 21 is nowhere near or affected by the baffle plate 29. The Examiner alleges that the "dam 29" is adjacent to a "drain 18" (as mentioned, 18 is not a drain), and it would therefore have been obvious to locate the dam 29 in the air inlet duct for "preventing water from getting admixed with steam in the form of water drops and preventing too great a rate of evaporation." There is no suggestion anywhere that a baffle plate near a water inlet to prevent squirting should in any way direct water flowing along a duct wall toward a drain. That disclosure comes only from Applicants. For such reasons claim 3 should be allowed.

Claim 5 is dependent from claim 3 recites that the dam is a strip extending diagonally across air flow and wherein the drain is near the downstream end of the strip. Maybe the baffle plate 29 could be considered a "strip" but it certainly is not shown as diagonal. (One cannot determine from the Graemiger reference whether the angle iron baffle plate extends circumferentially within the chamber 19. It is more likely that this is just a short piece of angle iron opposite the inlet 18 since that is all that should be needed to prevent squirting.) Nowhere is it suggested that a strip should extend diagonally across air flow nor that there should be a drain near the downstream end of a strip. The Graemiger baffle plate appears to be perpendicular to steam flow (although it is unknown how steam actually flows in such a rotating compressor). Thus, it does not have a "downstream" end and its end would be near an inlet rather than an outlet. For these additional reasons, claim 5 should be allowable.

Claim 6 has been rewritten in independent form. This claim recites that there is a drain on a non-horizontal wall portion of the air inlet duct above the bottom of the duct and there is a dam extending into air flow for directing water toward the drain. The Examiner concedes that Graemiger does not disclose that the dam extends into air flow through the inlet for directing water toward the drain. There is no suggestion anywhere that there should be a drain on a wall of the air duct above its bottom with a dam for directing water toward that drain. All of the drains in the Graemiger reference are at the bottom since that's where water collects. Instead of that, Applicants place a drain above the bottom and direct water toward the drain above the bottom. Absent some suggestion of this structure or even the desirability of such structure, the drain structure cannot be considered to have been obvious. Thus, claim 6 is considered to be allowable.

Claim 8 is dependent from claim 6 and considered to be allowable therewith. In addition, this claim recites that the dam extends diagonally across the duct with the drain near the lower end of the strip. Claim 8 should be allowed for the same reasons as claim 5.

Claim 18 was previously (and erroneously) indicated to be dependent from claim 10. The claim has been re-written in independent form incorporating subject matter from original claim 13. Neither claims 18 nor 19 and 20 which are dependent from it were rejected for any

reason except § 112. Since those objections have been corrected by re-writing claim 18, the rejections should be withdrawn and all three of these claims allowed.

Claim 31 is a method for removing water from a compressor inlet air duct. The claim now recites diverting water flowing along a wall in the general direction of air flow inside the duct to a drain and sucking water from the drain. The claim was rejected under 35 U.S.C. § 102 on the basis of any one of three patents issued to Anderson, Webb and Charron, respectively. The Webb reference can be dismissed quickly. This patent discloses an odorless toilet with a fan for removing odors from the bowl to a drain vent. No one skilled in the art is going to stick his head in a toilet (odorless or not) to solve Applicants' problem. Furthermore, there is no compressor air inlet duct; there is no diverting of water flowing along a wall inside the duct to a drain sucking water from such a drain. Thus the rejection under § 102 is clearly inappropriate.

The Anderson reference is at least in the same general art as this application. It concerns the inlet air for the compressor of a gas turbine. The subject matter is, however, quite different. The concern in the Anderson patent is for "intercooling" where a liquid is introduced into the air stream between two compressor stages for cooling the partially compressed air. Anderson cools the air into the first stage compressor by refrigeration coils T1, T2, etc. A possible problem recognized by Anderson is that water vapor in the inlet air may freeze on the refrigeration coils. To alleviate this, an antifreeze (alcohol) is added onto the coils to mix with condensed water and drip off into drain basins 3 below the coils. The collected liquid, which comprises a mixture of alcohol and water, is used for intercooling and is also used as an addition into the combustion zone between the compressor and turbine stages.

Applicants' claim 31 recites diverting water flowing along a duct wall in the general direction of air flow inside the duct to a drain. There is nothing in the Anderson reference suggesting that there is any water anywhere on a wall of the inlet air duct. Any water is a consequence of condensation on the refrigeration coils. Alcohol is added, and if anything, the resulting mixture of alcohol and water flows along the coils transverse to the direction of air flow into the drain basins instead of in the general direction of air flow. Thus, the rejection of claim 31 under § 102 is inappropriate.

Applicants submit that the Examiner has characterized some of the structure in the Charron patent erroneously to create some of the elements in Applicants claims. The Charron reference was applied in the PTO action as allegedly anticipating claim 3, for example. According to the Examiner there is an air inlet duct 36 to the compressor. The Charron reference concerns a compressor for two-phase fluid wherein the mixed phase enters through an inlet line 30, passes through an impeller 35 and into the outlet diffuser 36. The Charron patent, however, states that the outlet channel comprises a diffuser 36, a curved channel 37 and a return diaphragm 38 (col. 5, lines 27-28). Thus, the alleged air inlet duct is an outlet from the compressor stage 35 instead of an inlet.

The rotor blades 45 (of the impeller) induce a circumferential flow in the diffuser passage 36 (FIG. 3). The liquid phase is thereby centrifuged toward a circumferential collecting channel 39. The vapor phase goes on through the curved channel 37 and return diaphragm 38. Liquid spinning in the collecting channel spins out through nearly tangential pipes 42j (FIG. 3).

However, despite this explicit teaching in the reference, the Examiner states that a "dam 39 extends into the air flow through the [inlet] duct for directing water toward the drain [42j]". A channel (39) is not a dam. A channel is actually the opposite of a dam. For this reason alone claim 3 is different from anything disclosed in Charron. That rejection must be withdrawn.

As to claim 31, the Examiner states that "diverting also comprises placing the dam 39 across a portion of the air flow through the duct . . " The Examiner cannot convert the channel to a dam simply by calling it a dam. The rejection of claim 31 should be reconsidered and withdrawn.

Claims 32 - 34 are dependent from claim 31 and should be allowed therewith.

Claim 35 was rejected under §102 on the basis of the odorless toilet described and illustrated in the Webb patent. Claim 35 recites *inter alia* sucking water through a perforated tube. According to the Examiner water is sucked through a perforated tube 1/15 in the Webb patent. However, this is contrary to the teachings of Webb "air entering the orifices denoted by 15 are (sic) drawn through by impeller means 16 . . . ." Air isn't water. Thus, the rejection of claim 35 under 35 U.S.C. § 102 is inappropriate and should be withdrawn.

Claims 3-8, 10-12, 14-20, 22-35 and 37-39 remain in this Application. Claims 4, 7, 14 to 16, 23, 27, 28, 37 and 39 are indicated to be allowable subject to being re-written in independent form or resolving questions under § 112. These claims are now in condition for allowance as point out in detail hereinabove. Applicants believe that all of the remaining claims are also in condition for allowance and such action is respectfully requested.

If there are additional issues that need addressing before allowance of this application, it is suggested that a telephone call be placed to the undersigned. It is our experience that such telephone interviews are of great assistance in defining and resolving issues, thereby leading to early disposal of applications.

Respectfully submitted,
CHRISTIE, PARKER & HALE, LLP

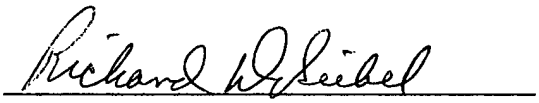
By 
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FIG. 1

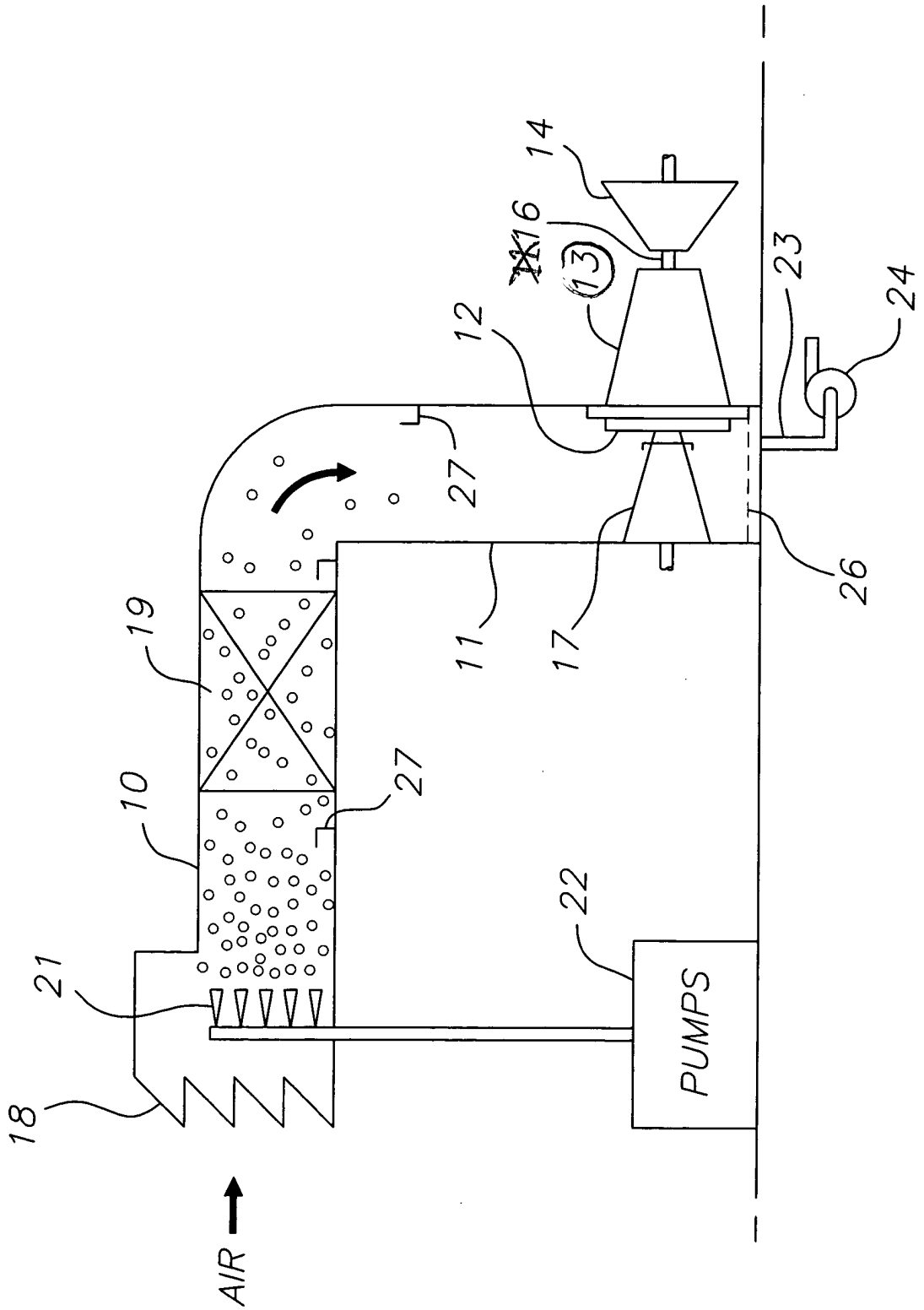


FIG.3

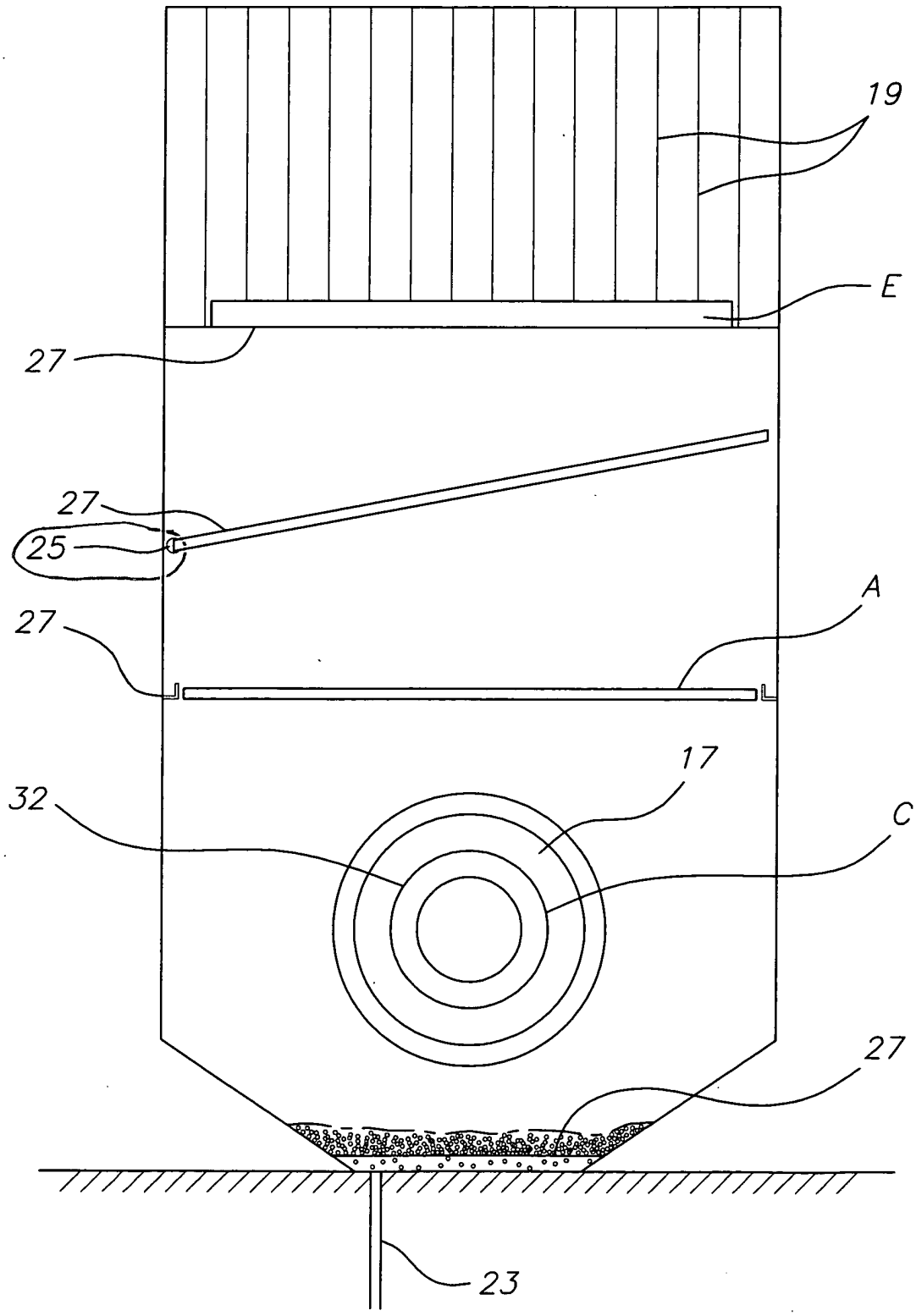


FIG. 6

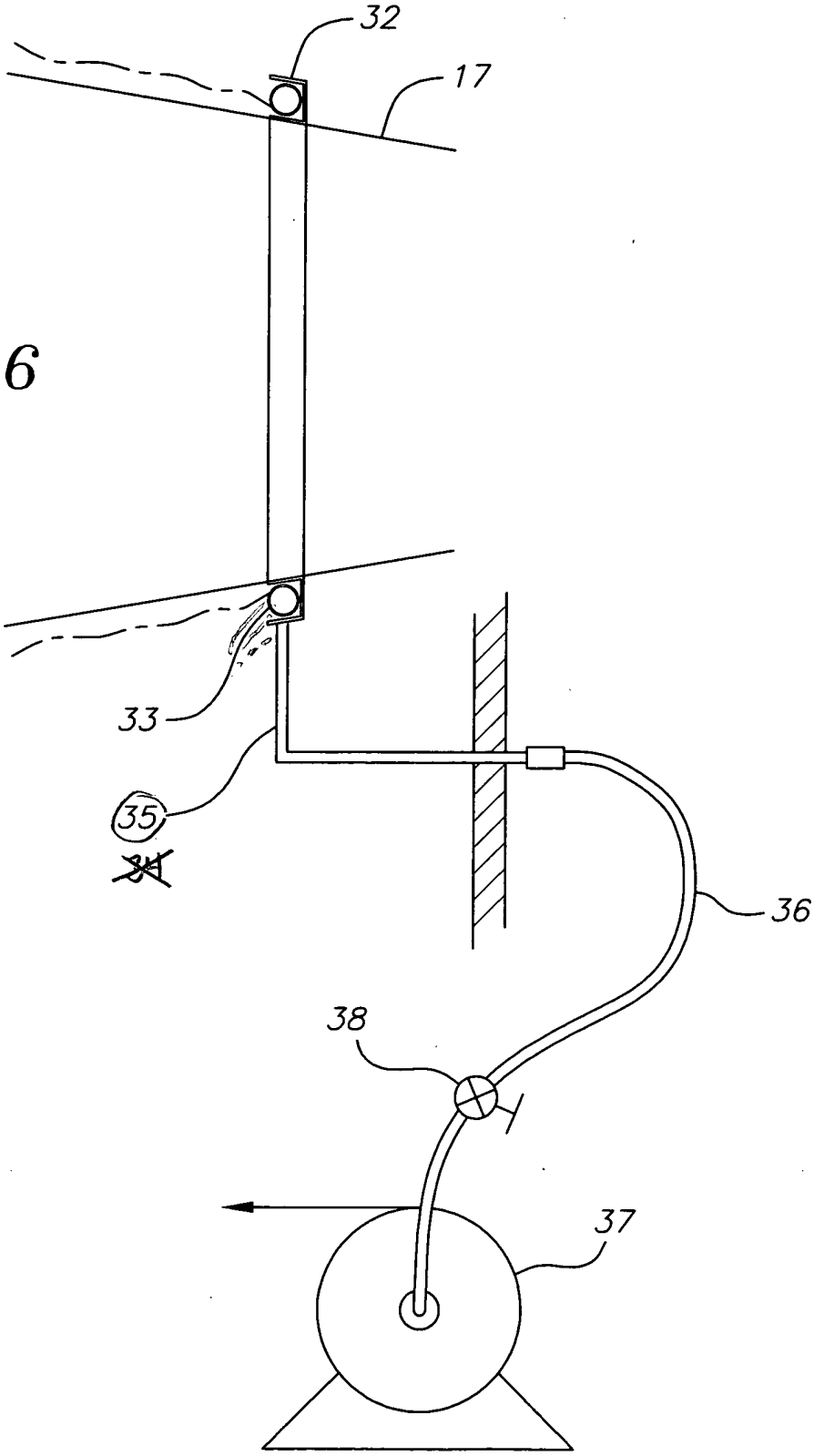


FIG. 7

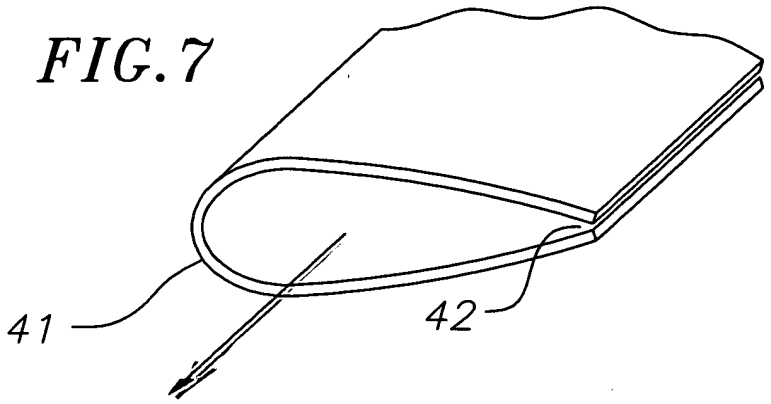
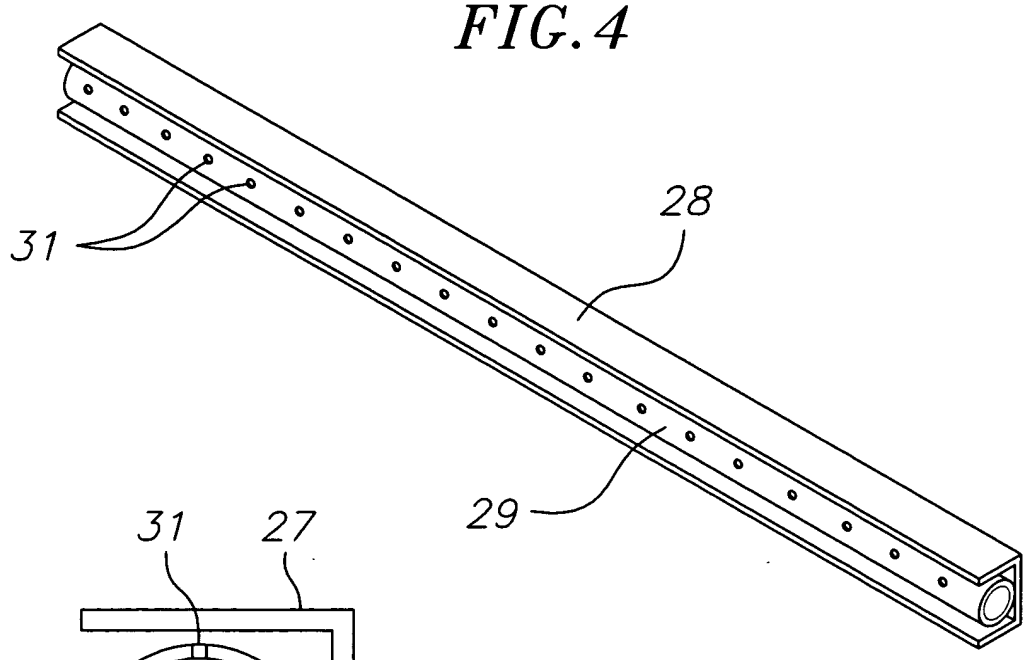


FIG. 4



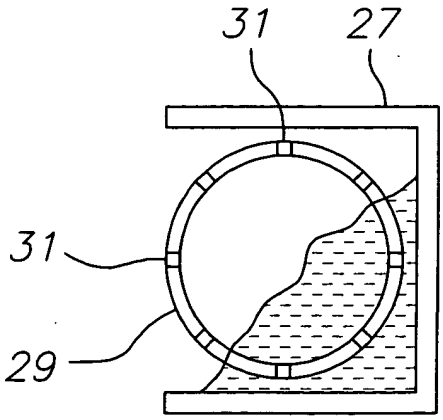


FIG. 5